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(12) UK Patent Application (19) GB (11) 2 190 574 (13) A

(43) Application published 25 Nov 1987

(21) Application No 8701624

(22) Date of filing 26 Jan 1987

(30) Priority data

(31) 8612543 (32) 22 May 1986 (33) GB

(51) INT CL[4]
A01K 5/02

(52) Domestic classification (Edition I)
A1M FH
U1S 1021 2186 A1M

(56) Documents cited
GB 1580049
US 3929277

(58) Field of search
A1M
G1W
Selected US specifications from IPC sub-classes A01K
G01G

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(54) Improvements relating to the rearing of animals

(57) The invention provides for electronic monitoring and feeding a group of pigs from twelve weeks to twenty six weeks old, wherein pigs compete for feedstuff from a hopper at which only one pig 10 can feed. Each pig must enter a cubicle to reach the hopper 26 and as it enters, detectors 116, 118 detect the presence of the pig 10; the weight of feedstuff in the hopper is measured before the pig reaches it, and an aerial detects the specific pig in the cubicle. When the pig has finished eating, its departure from the cubicle is sensed and the feedstuff in the hopper again weighed so that the amount of feedstuff eaten by each pig at each visit is measured. Periodically, the pig is weighed and its fat layer thickness measured to indicate its feedstuff conversion efficiency. In this way the farmer can determine more efficiently when to sell individual animals or send them to market.

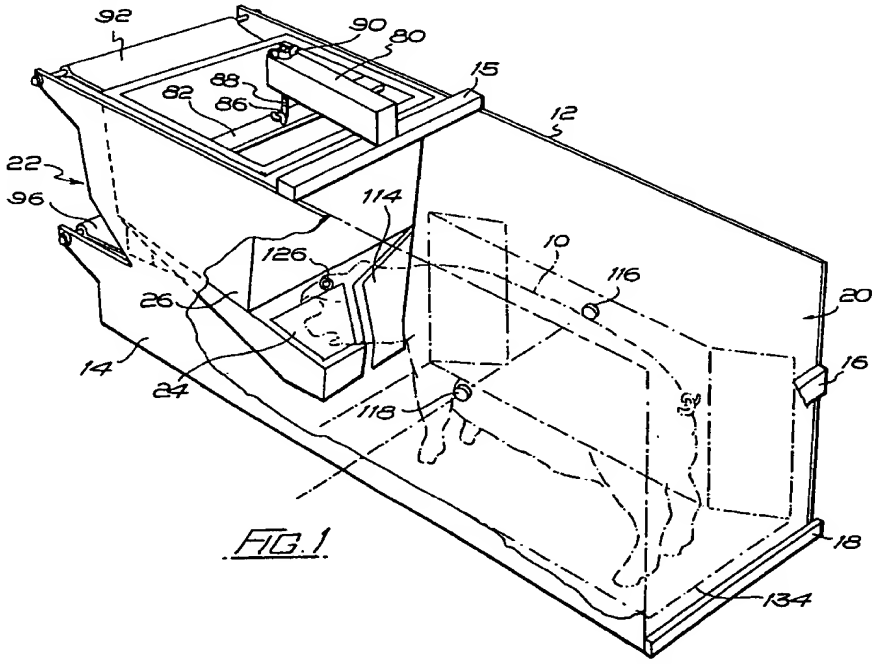

FIG. 1

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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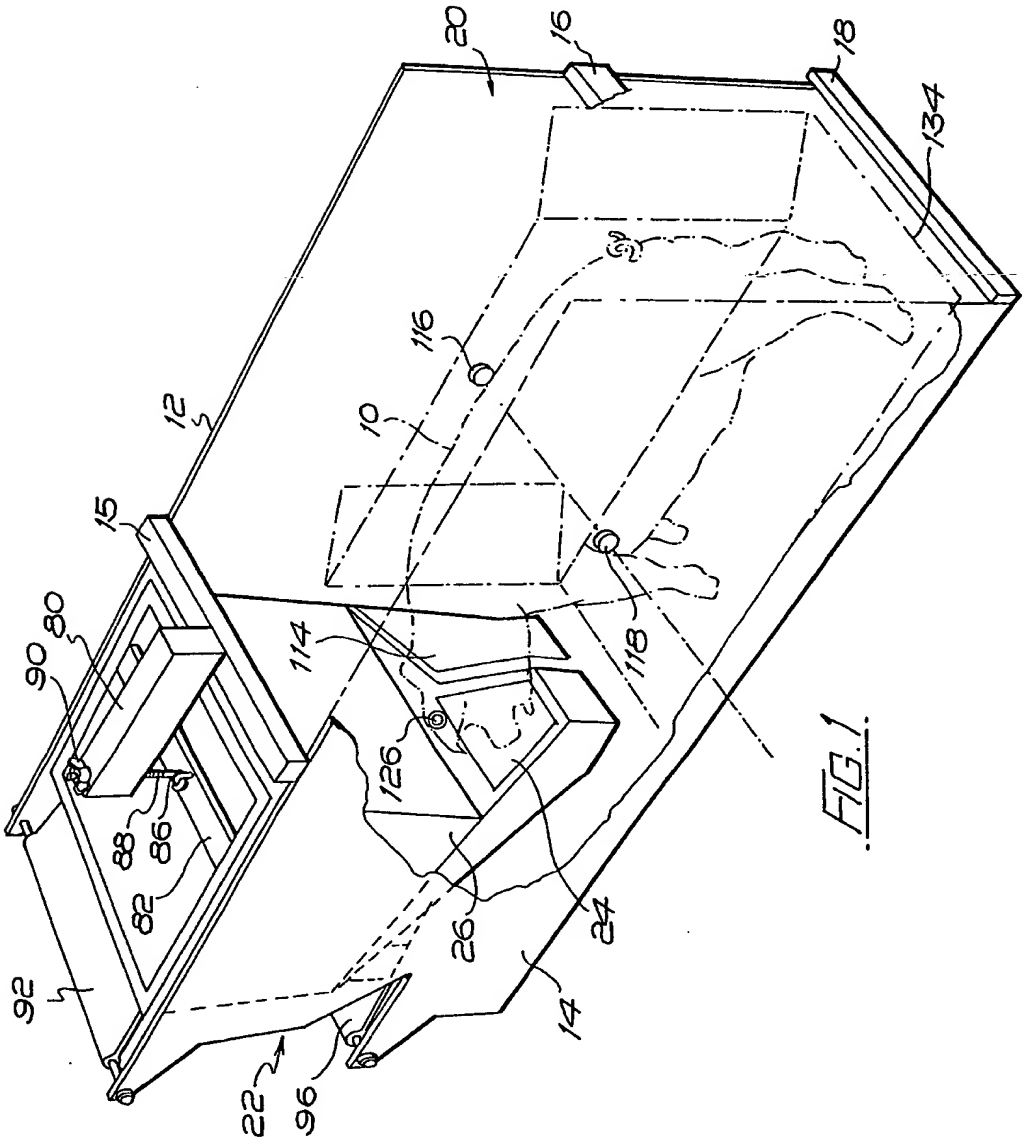

FIG. 1

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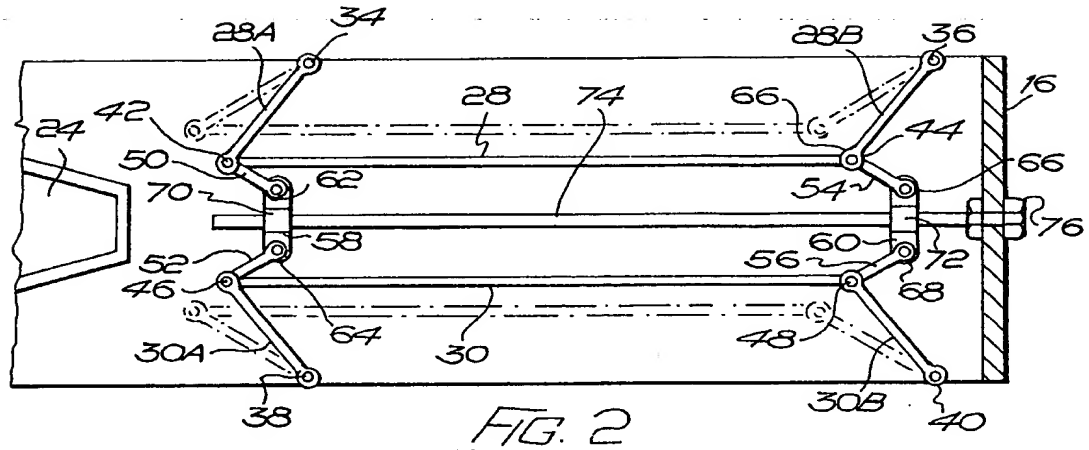

FIG. 2

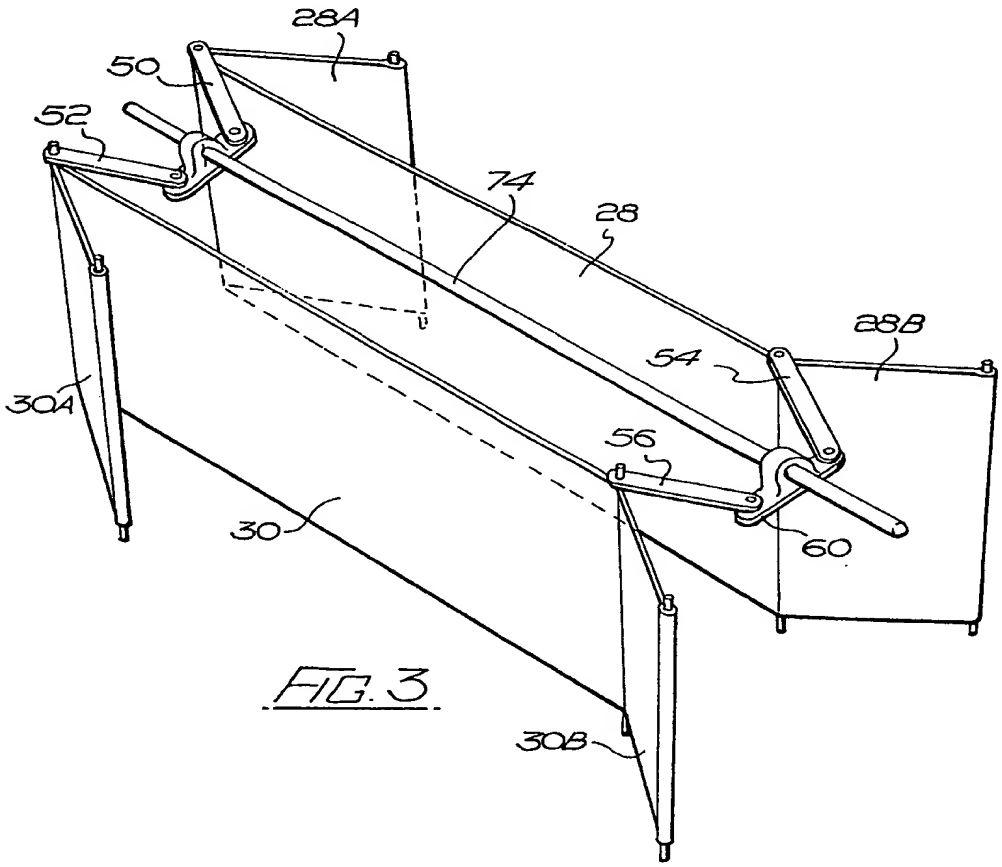

FIG. 3

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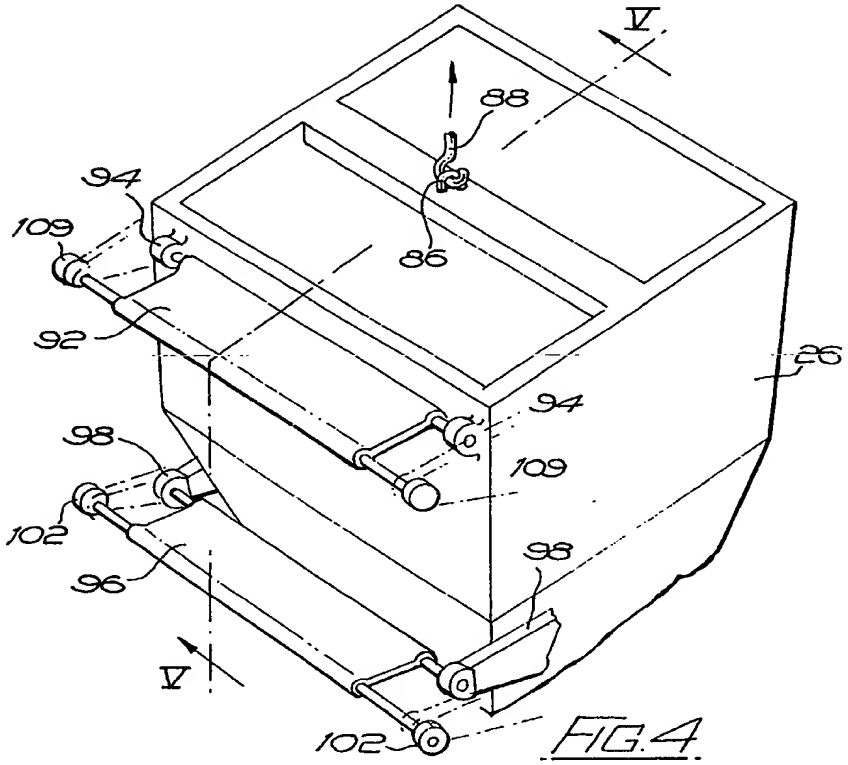

FIG.4

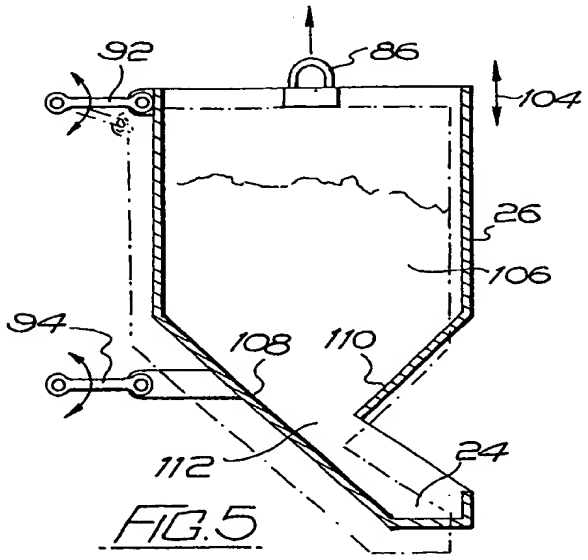

FIG.5

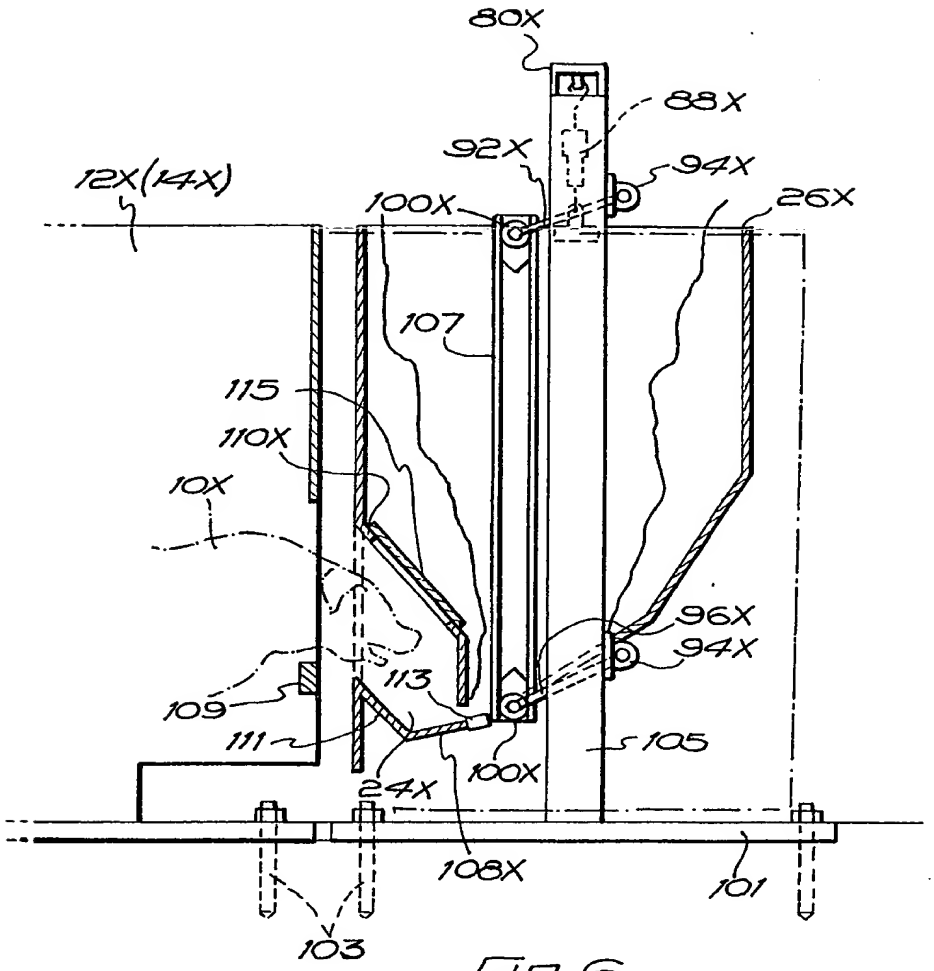
80X
88X
92X
94X
12X(14X)
100X
26X
107
115
110X
10X
96X
94X
113
109
111
105
24X
100X
108X
101
103

FIG. 6

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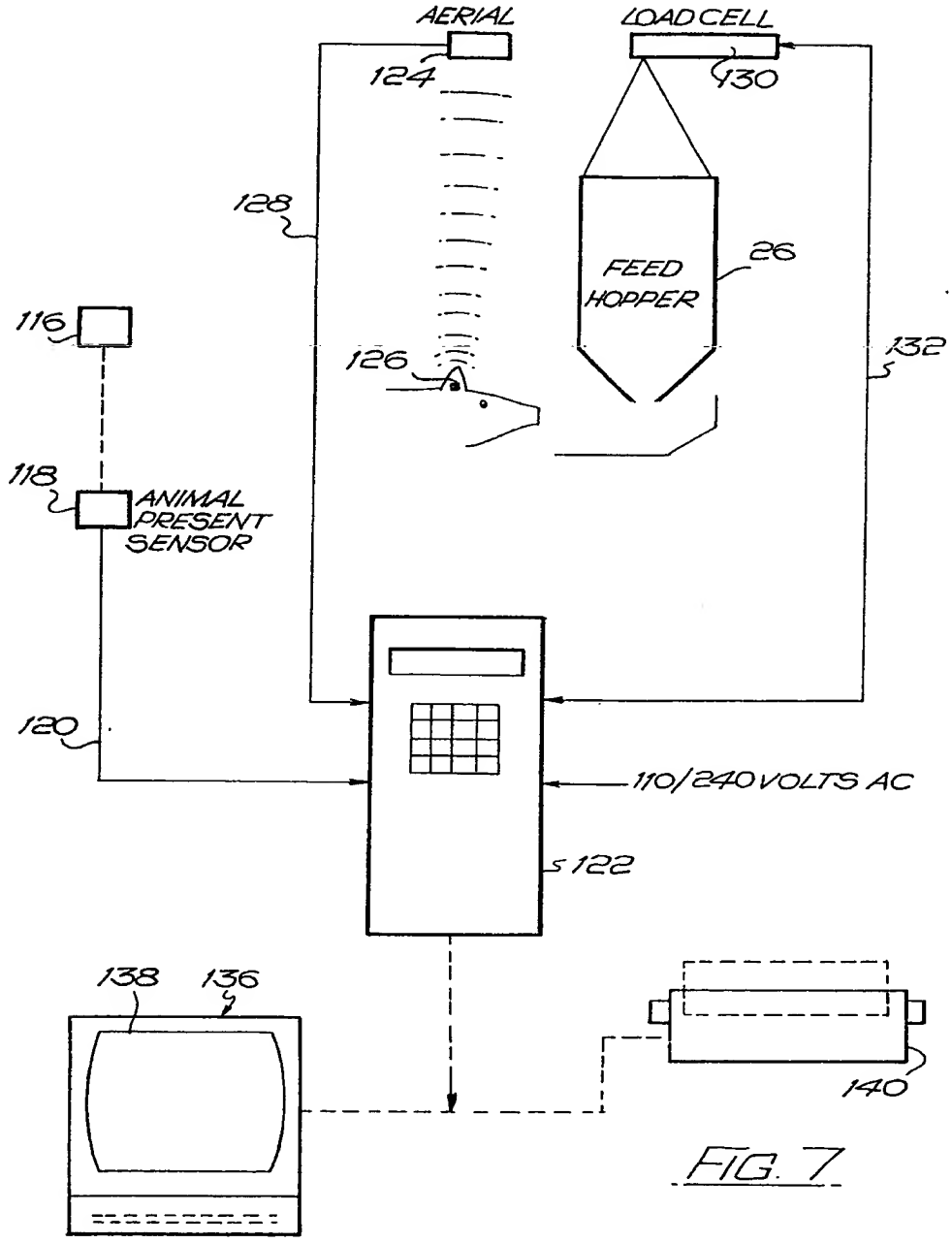

FIG. 7

SPECIFICATION

Improvements Relating to the Rearing of Animals

This invention relates to animal husbandry, and in particular concerns a method for the feeding of animals for the monitoring of a conversion by animals of feedstuff into body weight.

Because of efficiency demands, the rearing or breeding of animals, such as pigs, is approached today on a much more scientific basis than say thirty years ago. That is to say it is no longer sufficiently efficient to allow animals to feed randomly from a common feeding source, because invariably different animals consume different amounts of food and there is no effective measure to indicate how efficiently any particular animal converts that food into body tissue or fat as the case may be.

If a farmer or breeder can raise his animals however upon a much more efficient basis, then he can produce more predictable results over preset rearing periods, and he can capitalise on this efficiency by for example taking his animals earlier to market or from another aspect he can identify more quickly when particular animals are feeding poorly and may perhaps be unwell.

There are today systems for the control of feeding of animals and typically such systems comprise automatic feed dispensing means controlled by the animals or on a time basis. In one system, an animal may be provided with a transmitter transmitting a signal unique to that animal, and a feed location may be provided with a receiver responsive to that signal so that when the animal arrives for feedstuff, the signal emitted therefrom may be detected and the quantity of feedstuff metered into a feeding bin. The system can be controlled to ensure that each animal is given only a preset amount of feedstuff per day or per half day as the case may be, and the system would be provided with computing means for logging such things as the frequency of arrival of each animal at the feeding location, the amount of feedstuff consumed by each animal and so on, and such data could be co-related and displayed by graph, print out or on a VDU to provide the farmer or breeder with meaningful information on each animal's feeding habits.

The present invention is concerned with systems of this type in general, but the system of the invention looks at the rearing and monitoring of animals in a different and novel manner.

In one system for feeding pigs in this way the feeding location is a cubicle having a rear gate which closes when the pig arrives in the cubicle, preventing other pigs from entering the cubicle and from disturbing an eating pig. In a sense therefore there is no competition, for the feedstuff.

The present invention is based on the premise that it is desirable to keep a check on the animals performance in turning feedstuff into lean tissue because if a breeder can monitor this efficiently, then he can most quickly get his animals to best condition for sale and at the earliest time but taking into account the fact that animals will reach prime condition at different rates depending upon their respective feedstuff conversion efficiencies.

The significant departure of the present invention is that at each feed, typically during a rearing period for the animal, each animal is allowed to eat as much feedstuff as it wishes to satisfy its appetite and in accordance with the first aspect of the invention there is provided a method of feeding animals over a preset monitoring period wherein each animal is provided with its own unique identification means, it feeds from a dispensing device at which, during each feed, it can consume as much feedstuff as required, and its presence at the feeding station, and the amount of feedstuff which it eats at each feed is automatically monitored.

By allowing each animal to feed in this way, and by monitoring how much it eats, then by subsequent and conventional techniques of weighing and checking the animals body fat layers, an indication is given of the efficiency of the animal in converting the feedstuff into lean meat over the preset time period.

A farmer using such equipment can therefore obtain an indication of how efficiently the animal is converting the foodstuff, and the best time to sell the animal or take it to market which adds considerably to the overall efficiency of the farmers' business.

The preset time period may be as short or as long as desired, or indeed it may be dictated by each animal increasing in weight from a first lower value to a second higher value, and therefore the preset period may be different for different animals.

The invention also provides apparatus for use in the method, and typically such apparatus may comprise a cubicle into which only one animal at a time can enter, means defining a feeding location from which the animal can feed when in the cubicle, storage means housing sufficient feedstuff to enable one animal to eat as much feedstuff as it requires, weighing means for weighing the amount of feedstuff eaten by each animal at each visit to the cubicle, detection means for detecting which animal is in the cubicle.

It is preferred in the present invention that the animals compete for feedstuff and to this end the front of the cubicle is left open so that other animals can annoy the feeding animal to endeavour to force it out of the cubicle so that other animals can eat. This is a significant factor in assessing conversion efficiency.

The cubicle may comprise inner wall structures which relatively can be moved closer together and further apart within physical limits of the apparatus in order to control the size of a space into which the animal fits, to ensure that only one animal at a time can enter the cubicle.

Said wall means may be plates mounted on parallelogram linkages movable together and apart by a screw displacement mechanism.

The means provided for storing sufficient feedstuff may comprise a hopper suspended on a suspension device embodying a weight measuring transducer whereby the weight of the feedstuff in the hopper can be measured electronically. The hopper may be movable up and down depending upon the weight of the feedstuff contained therein,

and its movement may be controlled by virtue of the hopper being connected to a pair of parallelogram linkages to ensure that the hopper will move up and down only in a particular predetermined fashion.

The equipment may additionally comprise a weighing device located to the underside of the cubicle so that when each animal is in the cubicle and is feeding, its weight can be automatically measured. Such a weight measuring means would be connected into the electronic control system of the apparatus so that the weights of the animal could be recorded. With the computing system receiving data at each visit of the animal to the cubicle and comprising the weight of the animal before commencing eating, the weight of the animal after finishing eating, the identification of the particular animal, the weight of feedstuff consumed, then a whole range of printed and visual display material can be produced from the computing equipment to give the farmer or breeder an indication of the animals food consumption requirement, state of health and other conditions.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, wherein:—

Fig. 1 is a cut-away perspective view of part of apparatus for performing the method and according to the present invention;

Fig. 2 is a plan view of part of the apparatus shown in Fig. 1;

Fig. 3 is a perspective view of part of the apparatus shown in Fig. 2;

Fig. 4 is a perspective view of one end of the apparatus shown in Fig. 1;

Fig. 5 is a sectional view of the apparatus as shown in Fig. 4, section being taken on the line V—V of Fig. 4;

Fig. 6 is a part sectional view showing a modified form of apparatus according to the present invention; and

Fig. 7 is a diagrammatic view showing the circuit of a control system of the apparatus according to Fig. 1 or Fig. 6.

Referring to the drawings, and firstly to Fig. 1, the apparatus shown is for use in the rearing of pigs, but it is to be mentioned at this time that the apparatus according to the invention can be used for other animals such as goats, cows, sheep and ruminants.

The apparatus shown is for receiving an animal such as the pig 10 whilst it is feeding, and so that the animal's feeding pattern or habits can be monitored.

The apparatus comprises essentially a cubicle made up of a pair of spaced plates 12 and 14 which are constructed suitably of metal so as to have substantial rigidity. The plates are held in spaced parallel relationship by means of a plurality of cross bars such as 15, 16 and 18, and others (not shown). When the apparatus is in use, the plates 12 and 14 which are rectangular lie in vertical planes but with their longer sides horizontal so as to define a front end 20 and a rear end 22 of the apparatus. The front end 20 is essentially open so that the pig 10 can enter the apparatus through the open end in order to reach a feeding position as shown in Fig. 1 in which the pig can feed from feeding bin 24 forming part of a hopper 26 to be described hereinafter.

When the pig has completed its feeding it moves backwards out of the apparatus.

The apparatus is intended to be used by a plurality of pigs in turn and to this end the hopper 26 is of sufficient capacity so as to accommodate a large volume of feedstuff, i.e. of the order of ten times what any one pig is capable of eating.

In order to ensure that only one pig will enter the apparatus at only one time, between the front end 20 and the hopper 26 is a width control mechanism of the construction shown clearly in Figs. 2 and 3. This width control mechanism comprises a pair of parallel plates 28 and 30 which also are arranged in vertical planes, are rectangular, and also lie with their longer sides horizontal in the in-use position. The plates 28 and 30 at their respective ends are pivotally connected to link plates 28A and 28B in the case of plate 28, and 30A and 30B in the case of plate 30. These link plates 28A/B and 30A/B respectively are hingedly connected to the insides of the plates 12 and 14 at pivot points 34, 36, 38 and 40. The plates 28 and 30 are connected to link plates 28A/B and 30A/B at pivot points 42, 44, 46 and 48.

Connecting bars 50, 52 and 54, 56 connect the pivot points 42, 46 and 44, 48 to a pair of brackets 58 and 60. Each bracket 58 and 60 is pivotally connected to the respective links 52, 54 at pivots 62, 64 and 66, 68 and the brackets are provided with nut blocks 70 and 72 which are engaged by a threaded rod 74 having at the front end a turning nut 76 and being supported by the cross bar 16.

In view of this construction, it will be understood that by turning the rod 74, so the bracket 70 and 72 are made to move axially of the rod (which in itself is restrained from axial movement), and this in turn pivots the links 50 to 56, in turn pivoting the plates 28 and 30 relative to their link plates 28A/B and 30A/B so that the spacing between the plates 28 and 30 can be adjusted.

The reason for proviing the capability of adjustment is that the apparatus is intended to be used in connection with pigs over a particular period either set by a fixed time or set by the pigs growing from a lower weight to a preset higher weight, because during such period the pigs will increase substantially in size and width and therefore the plates 28, 30 must be capable of being moved apart to accommodate the increase in size of the pigs. The plates 28 and 30 are of course positioned so that at any time during the said period, only one pig can enter the apparatus. Fig. 2 shows one position of the plates 28 and 30 in full lines as used when the pigs are of relatively small size, and an alternative position in dotted lines when the pigs have increased in size.

Referring now to the construction of the hopper 26, it is to be mentioned that the hopper which is for receiving feedstuff such as grain or the like is in fact suspended by means of an arm 80 supported on cross bar 15 and extending in a rearwards direction. The arm 80 includes a strain gauge for measuring the weight of the hopper and its contents, as will be explained in relation to Fig. 7. The hopper is generally square at the top end and has a support

bar 82 provided with an eye 86. This eye is engaged by means of a suspension hook bolt 88 which passes through the arm 80 and is provided with an adjusting wing nut 90 to ensure the correct suspension of the hopper 26 by the arm 80.

The hopper is held in position by a pair of parallelogram type link plates 92 and 96 of which the longer edges are respectively pivotally mounted in bearings 94 and 98 on the hopper, and bearings 100 and 102 carried by the side plates 12 and 14. The purpose of the parallelogram supports, as shown in Fig. 5 are to enable the hopper 26 to have a degree of vertical up and down movement as indicated by arrow 104 in Fig. 5 so that the strain gauge in the arm 80 can be strained in accordance with the weight of material carried by the hopper and the weight of the hopper itself.

At the lower end, the hopper is tapered inwardly so as to cause the feedstuff 106 carried by the hopper to gravitate towards the feed shoe 24 from whence the animal can feed. As shown in Fig. 5, the lower end of the hopper defines inwardly inclined surfaces 108 and 110 leading to a mouth 112 through which the feedstuff 106 can gravitate and can continue to slide down the inclined surface 108 and into the feed shoe 24.

On opposite sides of the feed shoe 24 there may be blanking plates 114 as shown in Fig. 1 to ensure that the pig will feed from the feed shoe 24.

It will be understood that as any particular animal consumes feedstuff from the shoe 24, this is replenished by feedstuff passing the mouth 112, but the overall weight supported by the arm 80 and detected by the strain gauge is reduced as feeding continues.

Referring to Fig. 6, in this figure is shown an alternative embodiment of the apparatus which essentially operates in precisely the same principle as the apparatus of Fig. 1, except for the following modifications. The hopper 26X is isolated from the plates 12X, 14X forming the cubicle for the animal 10X in that the hopper is supported on a base 101 which is bolted to the floor by bolts 103 and has supporting legs 105 carrying the hopper through the parallelogram links 92X and 96X. The bearings 94X are carried by the legs 105 whilst the bearings 100X are carried by reinforcing bars 107 attached to the sides of the hopper 26X. A bar 109 prevents the animal 10X from coming too close to the hopper feeding shoe 24X, whilst enabling the animal to feed as shown. Stradling the top ends of the legs is a mounting bar 80X which carries the load cell referred to in relation to the Fig. 1 embodiment, and suspended from the cross-bar is the hopper 26X by means of a suspension arrangement 88X.

The design of the hopper is also modified in that the wall 108X is provided with an upwardly turned portion 111 and the hopper portion 108X is provided with a removable bung 113 which can be removed for the purposes of cleaning the hopper. The hopper section 110X is provided with an aperture closed by means of an aerial supporting plate 115 which supports the receiver of the detection system to be described.

By isolating the cubicle defined by the plates 12X, 14X from the hopper 26X, the advantages obtain that the hopper does not receive excessive impacts from the animal 10X which could cause malfunctiong and spurious readings from the load cell.

It is an important aspect of the present invention that the animal can feed from the apparatus to the extent it requires until satisfied, and this distinguishes the present invention from conventional systems in which only a preset amount of feedstuff or a multiple thereof is fed to each animal.

The apparatus is combined with a control and monitoring system so that the farmer or breeder can keep a watch and monitoring surveillance over each animals feeding habits and patterns whereby he can make his business of increased efficiency. The period over which the animals may be watched could be for example over the period when the animals grow from a weight of 35 kg (typically pigs of age twelve weeks) to a weight of 95 kg (typically pigs of age twenty weeks) or alternatively monitoring can be conducted over a preset time period, say two months.

Referring now to Fig. 7, reference numerals 116 and 118 represent a pair of detectors between which the animal passes in entering the apparatus. These detectors are shown in Fig. 1 and will also be present in the Fig. 6 embodiment, and it will be seen that they are located approximately, mid-way of the length of the cubicle in which the animal stands. They are located so that the animal will interrupt a beam extending between the detectors resulting in the issuance of a signal that an animal has arrived in the cubicle, and such signal is sent over a line 120 (Fig. 7) into a monitor unit 122. Also connected to the monitor unit 122 is an aerial 124 which is for detecting which particular animal has arrived in the cubicle. The aerial will be located in the Fig. 6 embodiment behind the detector plate. Each animal is identified by a transmitting unit 126 tagged to the animals ear, as shown in Fig. 7, and the transmitter carried by each animal is unique to that animal. When the aerial detects that an animal has arrived at the feed hopper, a signal is sent over line 128 to the unit 122. The strain gauge or load cell in arm 80 or cross beam is indicated in Fig. 7 by numeral 130, and the load cell sends a signal representative of the weight of the hopper 26 and its contents over line 132 to the unit 122.

Unit 122 is programmed to operate in the following fashion.

When the arrival of a pig in the cubicle is first detected by the sensors 116 and 118, the load cell 130 is conditioned over line 132 to take a reading of the weight of the feed hopper and its contents and this takes place before the animal arrives at the hopper, hence the reason for positioning the sensors 118, 116 spaced from the hopper 26. At the same time the aerial 124 is made operational so that it will be set to sense which animal has arrived in the cubicle and will arrive at the hopper. When the animal does arrive, it is identified via a signal from the aerial 124 and that information is stored in unit 122 as is the weight of the hopper and its contents.

When the animal has finished feeding, it backs out of the cubicle permitting the establishment of the beam between detectors 116 and 118, and when this event happens, a further reading of the weight of the hopper and its contents is taken by the load cell 130, and that information is stored in the processor 122. If required and in addition the unit 122 may also be programmed to time the period during which the animal feeds, and also there may be provided a weighing platform underneath or forms the base or cubicle so that whilst the animal stands in position feeding, it can be weighed, and it can be weighed at the beginning of feeding and at the end of feeding. A weighing pad is indicated in dotted lines by reference numeral 134 in Fig. 1.

The information in the processor 122 can be processed or handled in any desired fashion as is known in the field of data handling and processing, but for example it may be outputted to a computer 136 provided with a display screen 138 and/or it may be outputted to a printer such as printer 140 so that the results can be obtained in hard copy form. These results can be obtained and interpolated over the period of testing and monitoring, and during this period, the beginning and/or end, the animal can be weighed separately if the weighing pad 134 is not provided and/or it can be tested for the increase in lean tissue achieved by the animal over the period and/or it can be tested for the increase in fat in the animal over the period. The testing or increase in lean meat and/or fat can be conducted by conventional means involving the use of ultra sound to measure the thickness of the fat layers on the animal.

The information which can be achieved by the method and apparatus of the invention includes but is not limited to items such as:

1. How much food is required to produce a certain quantity of lean meat and in what time.

2. An indication as to whether or not any particular animal is ill for example if it suddenly stops eating.

3. The system ensures that each pig can eat as much as it likes and also there is no danger of any animal being unsatisfied.

The control system can be provided with various alarm functions to indicate for example when the hopper needs to be topped up with feedstuff, when the system is not functioning, when a pig which has lost its ear tag arrives in the cubicle or if a particular pig does not eat what is expected of it.

The invention has certain advantages as follows:

1. Each animal can eat as much as it wants and potentially lay down as much lean tissue growth as it is capable.

2. Each animal can be identified.

3. Each animal feed intake can be logged and accumulated in the computer database.

4. Each animal still has to compete for feed as in a normal animal pen.

Using the invention a breeder can easily identify the animals (to be used for further breeding) which can most efficiently convert food to the maximum of lean tissue growth rate expressed in grams/day.

All previous systems have by specification limited the appetite of the animals and/or they have not had the capability of detecting food conversion efficiency. The present invention has the facility of accommodating both functions simultaneously.

CLAIMS

1. A method of feeding animals comprising:

a) providing each animal with its own unique identification means;

b) providing a dispensing device from which the animals can feed one at a time;

c) providing sufficient feedstuff in the dispensing device so that each animal can eat as much as it can consume at a visit to the device;

d) detecting the presence of each animal at the dispensing device; and

e) taking weighings before and after the animal has eaten to give a measure of the quantity of the feedstuff eaten by each animal.

2. A method according to Claim 1, including the step of taking weighing of the feedstuff eaten by each animal over a preset period of time or growth of each animal.

3. A method according to Claim 1, wherein the weight of the animal is also taken at intervals over said period.

4. A method according to Claim 3, wherein each animals' weight is taken each time it feeds at the dispensing device, the dispensing device having an animal weight measuring means for this purpose.

5. A method according to Claim 1, wherein the detecting step comprises detecting the presence of the animal before it reaches the dispensing device followed by taking a weighing indication of the total feedstuff in the dispensing device.

6. A method according to Claim 4, including the slip during the period of measuring the thickness of the fat layers on each animal to provide an indication of the efficiency of each animal in converting feedstuff into lean meat.

7. A method according to Claim 6, including the step of correlating the readings to provide comparisons.

8. A method according to Claim 1, wherein the animals being monitored are arranged so as to have to compete for feedstuff from the dispensing device, and whilst each animal is feeding at the device it is still open to disturbance or biting by other animals.

9. A method according to Claim 1, wherein the animals being monitored are pigs.

10. An apparatus for feeding animals comprising:

a) a cubicle into which only one animal can enter at any one time;

b) means defining a feeding location from which the animal can feed when in the cubicle;

c) storage means housing sufficient feedstuff to enable any one animal to eat as much as it can whilst in the cubicle;

d) feedstuff weighing means connected to the storage means to weigh said storage means;

e) detection means for detecting which animal is in the cubicle; and

f) control means controlling the operation of the feedstuff weighing means to weigh the storage means when an animal arrives in the cubicle but

before it starts eating and after it leaves the cubicle.

11. An apparatus according to Claim 10, wherein the cubicle comprises sides and has an inner end at which the storage means is located and an outer end through which the animal enters, said detection means being located between the cubicle ends to detect the presence of the animal before it reaches the storage means.

12. An apparatus according to Claim 11, wherein said sides comprise spaced plates and including parallelogram linkage means supporting and plate and operating means coupled to said parallelogram linkage means to move said plates closer together or further apart depending upon the size of animal.

13. An apparatus according to Claim 11, wherein the outer end is open so that an animal in the cubicle can be disturbed by another animal through said open end.

14. An apparatus according to Claim 11, including a sensor means responsive to an identification transmitter on the ear of each animal, said sensor means being embodied in an aerial located adjacent the storage means.

15. An apparatus according to Claim 11, wherein said storage means comprises a hopper, a feed shoe at the base of the hopper from which animals can feed, a suspension arm, a hook means connecting the suspension arm and the hopper whereby the weight of the hopper and the feedstuff are supported by the dispension arm.

16. An apparatus according to Claim 15, including a strain gauge embodied in said dispension arm for measuring the load carried thereby, said strain gauge forming part of said feedstuff weighing means.

17. An apparatus according to Claim 15, including a frame, links pivotally connected to the frame and to the hopper to guide the hopper in any movements it makes as a result of change in weight in the feedstuff therein.

18. An apparatus according to any of Claims 10 to 16, wherein the storage means is isolated from the means defining the feeding location preventing impacting by the animal in the storage means whilst the animal is feeding.

Amendments to the claims have been filed, and have the following effect:—

Claims 1 to 18 above have been deleted or textually amended.

New or textually amended claims have been filed as follows:—

1. An apparatus for feeding animals comprising a cubicle into which only one animal at a time can enter, means defining a feeding location from which the animal can feed when in the cubicle, storage means housing sufficient feedstuff to enable one animal to eat as much feedstuff as it requires, weighing means for weighing the amount of feedstuff eaten by each animal at each visit to the cubicle, detection means for detecting which animal is in the cubicle, central means controlling the operation of the weighing means to weigh the storage means when an animal arrives in the cubicle but before it starts eating and after it leaves the cubicle, said cubicle comprising inner parallel wall structures which relatively can be moved closer together and further apart by infinite adjustment within physical limits of the apparatus in order to control the size of a space into which the animal fits, to ensure that only one animal at a time can enter the cubicle.

2. An apparatus according to Claim 1, wherein the cubicle has an inner end at which the storage means is located and an outer end through which the animal enters, said detection means being located between the cubicle ends to detect the presence of the animal before it reaches the storage means.

3. An apparatus according to Claim 2, wherein the outer end is open so that an animal in the cubicle can be disturbed by another animal through said open end.

4. An apparatus according to Claim 1 or 2 or 3, wherein said inner wall structures comprise spaced plates and including parallelogram linkage means supporting said plates and operating means coupled to said parallelogram linkage means to move said plates closer together or further apart depending upon the size of animal.

5. An apparatus according to any preceding claim, including a sensor means responsive to an identification transmitter on the ear of each animal, said sensor means being embodied in an aerial located adjacent the storage means.

6. An apparatus according to any preceding claim, wherein said storage means comprises a hopper, a feed shoe at the base of the hopper from which animals can feed, a suspension arm, a hook means connecting the suspension arm and the hopper whereby the weight of the hopper and the feedstuff are supported by the suspension arm.

7. An apparatus according to Claim 6, including a strain gauge embodied in said suspension arm for measuring the load carried thereby, said strain gauge forming part of said feedstuff weighing means.

8. An apparatus according to Claim 6 or 7, including a frame, links pivotally connected to the frame and to the hopper to guide the hopper in any movements it makes as a result of change in weight in the feedstuff therein.

9. An apparatus according to any of Claims 1 to 8, wherein the storage means is isolated from the means defining the feeding location preventing impacting by the animal in the storage means whilst the animal is feeding.

10. An apparatus for feeding animals substantially as hereinbefore described with reference to the accompanying drawing.

Printed for Her Majesty's Stationery Office by Courier Press, Leamington Spa, 11/87. Demand No. 8991685.
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